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ABSTRACT

The study tested the hypothesis that teaching high school economics concepts first in a familiar mode or symbol system and then elaborating on the concepts in a second or less familiar mode facilitates classroom learning. Using an experimental design, 83 high school seniors were randomly and individually assigned to three separate classes, which in turn were randomly assigned three different classroom instructional treatments, each having a duration of 10 hours and taught by the students' regular economics teachers. It was predicted and found that comprehension of economics is facilitated by a teaching strategy that initially presents the concepts in a familiar verbal mode and then presents them in a more abstract way using graphs or other instructional imagery. The results imply that the type and order of presentation of symbol systems influence the learning of concepts in high school economics classes by facilitating or interfering with the generation of relationships between prior knowledge and new information. The findings also imply that presenting economics concepts in two symbol systems rather than one facilitates learning, provided, contrary to customary teaching methods, the teacher uses the familiar verbal presentation first and follows it with an integrative but less familiar graphic presentation. A 9-item list of references, the instructional treatments, and data tables are appended. (Author/TRS)

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Verbal and Imaginal Strategies in the Teaching of Economics

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Running head: VERBAL AND IMAGINAL STRATEGIES

Abstract

This study tested the hypothesis that teaching concepts in high school economics first in a familiar mode or symbol system and then elaborating on them in a second or less familiar mode facilitates classroom learning. In an experimental design, 83 high school seniors were individually assigned at random to three classes, which in turn were randomly assigned to three different classroom instructional treatments, each having a duration of 10 hours and taught by the students' regular economics teachers.

It was predicted and found that comprehension of economics is facilitated by a teaching strategy that initially presents the concepts in a familiar verbal mode and then presents them in a more abstract mode using graphs or other instructive imagery. This strategy compared favorably with two alternative procedures, one presenting the same content first in graphs and then verbally ($p < .001$), and the other using only one mode of presentation ($p < .01$).

These results imply that the type and order of presentation of symbol systems influence the learning of concepts in high school economics classes by facilitating or interfering with the generation of relations between prior knowledge and new information. The results also imply that presenting economics concepts in two symbol systems, rather than one facilitates learning, provided, contrary to customary teaching methods, that the teacher uses the familiar verbal presentation first and follows it with an integrative but less familiar graphic presentation.

Verbal and Imaginal Strategies in the Teaching of Economics

Economics is a required subject in the high school curricula of 27 of our 50 states (Dennis and Banaszak, 1981; Shaheen, 1985). Nevertheless, the teaching of economics from a learning theory perspective remains relatively unstudied. Another reason, perhaps less pressing but more provocative, for studying the teaching of economics is that it provides excellent opportunities for comparing spatial and verbal modes of instruction. Its basic concepts, such as supply and demand, can be expressed either verbally in propositions (using sentences) or spatially in appositions (using graphs and other interactive images). Although a discipline such as mathematics would also lend itself to spatial and verbal representation, a quantitative social science like economics has the advantage of dealing with concepts which are already familiar to students, who are then required to refine and more rigoriously define the concepts and ultimately apply them quantitatively.

In this paper, the effects of different teaching strategies are therefore studied in the context of the teaching of economics. The teaching strategies studied were chosen to test predictions derived from a cognitive learning model, called generative learning, and related psychological and educational research (Wittrock, 1974, 1978, 1981).

In brief, the model states that people understand concepts by relating them to familiar and relevant knowledge and experience,

from which they generate a meaning consistent with what they know or believe. The model also employs the notion that there are two fundamentally different processes by which learners relate new concepts to stored knowledge (verbal and spatial), corresponding to two apparently distinct ways of perceiving (analytic/propositional vs. synthetic/appositional). No doubt there are other comprehension processes and systems, as yet poorly understood, for representing concepts and for relating them to stored knowledge and experience, but there is already considerable support in the literature for the idea that a least two modes of perception exist and require acknowledgement.

The model presented in these paragraphs implies that students learn economics by relating its concepts to one another and to their relevant knowledge, using their analytic and synthetic learning strategies and metacognitive processes to generate representations and interpretations. A primary function of economic instruction is actively to engage these students' generative processes in the construction of relations between appropriate background knowledge and new or different concepts and economic models. The model implies, then, that <u>instruction is more effective when it begins with a familiar mode or thought process, and then elaborates concepts and relations in a second or less familiar mode or concept</u>. Formally stated, the hypotheses of this model are:

1. Instruction in economics that proceeds from verbal to imaginal (or graphical) representation of economic concepts produces greater comprehension of economic concepts than does a comparable sequence that proceeds from imaginal to verbal representation of the same economic concepts. (In a test of comprehension the mean of the "verbal to imaginal" group will be greater than the mean of the "imaginal to verbal" group.)
2. Instruction in economics that combines verbal and imaginal representations of concepts (in any order) produces greater comprehension of economic concepts than does comparable instruction that employs only verbal representation of concepts. (Both the mean of the "verbal to imaginal" group and the mean of the "imaginal to verbal" group will be greater than the mean of the "verbal only" group.)

Method

Participants

Eighty-three high school seniors from a lower-middle to middle socioeconomic level neighborhood in El Segundo, California, comprised the sample. There were 43 boys and 40 girls.

Procedure

All the economics students in this study were individually assigned at random to three classes in economics. These classes were then randomly assigned to the following three treatment groups:

1. Verbal to Imaginal Instruction
2. Imaginal to Verbal Instruction
3. Verbal-Only Instruction

To determine the equivalence of the three groups, all questions on demand, supply, and market price from forms A & B of the Test of Economic Literacy were administered at the beginnning of the study. The results of this pretest showed the potential participants to be naive about economics. All scored below 50 percent on the pretest. There were no statistically significant differences among the means of the three groups on the pretest. In order to insure that the measurement of the effects of imagery treatments occurred among groups of students who were able to use imagery or graphs to learn economics more or less equivalently; the groups were equalized by removing participants who had less than an acceptable minimum of capacities to understand economic imagery or graphs.

The teaching and testing time was held constant across the three treatment groups at 10 hours. To control and monitor the administration of each treatment, two trained economic educators were present for all three instructional sequences.

The students' regular economics instructor (the same person for all three groups) presented the instruction in all three treatments. The concepts covered included demand, supply, and equilibrium (market) price. The study was "double blind" in that neither the teacher nor the students were aware of the hypotheses or the design of the experiment.

The instructional sequences used in the three treatments are summarized in the following paragraphs. (See Appendix A for more detail.)

A. Verbal to Imaginal Treatment

1. Through lecture and discussion the teacher explained the five major characteristics of demand, including the universal characteristic of demand.
2. Through lecture and discussion the teacher explained three main determinants that cause changes in demand.
3. Through lecture and discussion the teacher explained the difference between a change in demand (the demand function itself) versus a change in the quantity demanded.
4. On the chalkboard the teacher depicted the concept of demand through use of a demand schedule.
5. The teacher on the chalkboard and the students on quad paper converted the demand schedule into a demand curve.
6. The teacher on the chalkboard and the students on quad paper demonstrated decreases and increases in demand through graphs; they moved the demand curves to the left and to the right. They graphically noted the difference between a change in demand and a movement along a given demand curve.

7. Supply was then presented following the above 6 steps.[2]
8. Through lecture and discussion the teacher explained how equilibrium (or market) price is one way of rationing goods and services among possible uses; she utilized the example of buying and selling wheat on the Chicago Board of Trade.
9. The teacher graphically depicted equilibrium (market) price.

B. Imaginal to Verbal Treatment.

The imaginal to verbal procedure followed the same pattern of content as did the verbal to imaginal sequence. However, in each step imagery or graphs were presented before rather than after the corresponding verbal representation of the concepts.[3] The steps were as follows:

1. On the chalkboard the teacher drew a graph of a typical demand function, exhibiting the universal characteristic of demand--a downward sloping to the right curve. The students then replicated these imaginal depictions on quad paper (equivalent to A_5).

Insert Figure 1 about here

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2. On the chalkboard the teacher depicted changes brought about by changes in the determinants of demand. The students illustrated these changes on quad paper (equivalent to A_6).

Insert Figure 2 about here

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3. On the chalkboard the teacher depicted a change in the quantity demanded caused by a change in the price of the good versus a change in the demand function itself (equivalent to A_6 part 2).

Insert Figure 3 about here

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4. On the chalkboard the teacher depicted the concept of demand through a demand schedule (equivalent to A_4).

Insert Figure 4 about here

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5. Through lecture and discussion the teacher verbally described the characteristics of demand including the universal characteristic of demand. The teacher then related this to the graphical depiction of downward sloping demand (equivalent to A_1).

6. Through lecture and discussion the teacher verbally described the three determinants of changes in demand and related them to previous depictions on the chalkboard (equivalent to A_2). The teacher then verbally identified the difference between a change in the demand function itself versus a change in quantity demanded brought about by a change in price (equivalent to A_3).
7. The above 6 steps were then followed with regard to supply (equivalent to A_7).
8. On the chalkboard the teacher drew graphs of the equilibrium price--where the quantity supplied equals the quantity demanded (equivalent to A_9).
9. Through lecture and discussion the teacher explained how equilibrium (market) price is one way of rationing goods and services among possible uses; she utilized the example of buying and selling wheat on the Chicago Board of Trade (equivalent to A_8).

C. Verbal Only Treatment

The verbal only sequence followed the same basic pattern of content as the verbal to imaginal treatment except all graphs were replaced by verbally expressed case studies by the teacher. The steps were as follows:

1. Through lecture and discussion the teacher explained the five characteristics of demand including the universal characteristic of demand (equivalent to A_1).
2. Through lecture and discussion the teacher explained the three determinants of demand that cause changes in demand (equivalent to A_2).
3. Through lecture and discussion the teacher explained the difference between a change in demand (the demand function itself) versus a change in the quantity demanded (equivalent to A_3).
4. The teacher asked the class how many See's Suckers they would be willing to buy at alternative prices but did not depict these results either through a demand schedule or a demand curve.
5. Through a verbally described case study on rock concerts the teacher applied C_1, C_2, C_3 above.
6. Through a verbally described case study on landscape maintenance of her home the teacher applied C_1, C_2, C_3 above.
7. The above 6 steps were then followed analogously with regard to supply (equivalent to A_7).
8. Through lecture the teacher explained how equilibrium (market) price is one way of rationing

goods and sevices among possible uses; she utilized the example of buying and selling wheat on the Chicago Board of Trade (equivalent to A_8).

9. Through a verbally described case study on a Super Bowl football game the teacher illustrated equilibrium price.

The reading materials for all three groups were congruent with each of the teacher's instructional sequences (Kourilsky, 1983).

Tests

All three groups were tested on their economic understanding at the end of the instructional period. They were told they could answer questions either verbaliy, graphically, or by using some combination of the above; all three modes were acceptable.

Thirty "true-false justify your answer" questions on the concepts of demand, supply, and market (equilibrium) price were submitted to two nationally renowned economists. These economists were asked to rate on a scale of 1-3 (with 3 the highest) each question according to the following criteria:

A. How well does the question measure knowledge of the concept (demand, supply, and market price)?
   1. a poor to fair measure;
   2. a fair to good measure;
   3. a good to excellent measure.

B. To what extent does the question allow the student to answer it correctly by using either verbal exposition or graphical depiction or both?

1. it lends itself better to verbal exposition;
2. it lends itself better to graphical depiction;
3. it lends itself equally well to either verbal exposition or graphical depiction.

Both judges agreed that all 30 questions accurately measured the concepts on a 3 (good to excellent) level. However, they agreed on only 10 questions that were equally amenable to verbal exposition and graphical depictions (See Appendix B for the 10 item test). The 10 item test then was given to 60 high school students (different students from those in the study) to determine its test-retest reliability ($r = .81$).

The 10 posttest questions were scored by two expert judges, who did not know which of the treatments any students received, and each answer was worth 2 points. One point was given for the correctness of the response, and a second point was given for the justification of the answer--either graphical or verbal.

The second instrument, which was used only as a pretest, included all questions on demand, supply, and market price from forms A and B of the Test of Economic Literacy, a nationally normed objective test published by the Joint Council on Economic Education.

Results

A one-way analysis of variance (1 x 3 design) was used first to analyze the data, with economic understanding as the dependent variable and the three instructional treatments as the independent variables.

The one way analysis of variance indicated statistically significant differences among the treatment means ($p < .01$). As predicted, the verbal to imaginal treatment produced the highest mean (14.1), followed by the imaginal to verbal treatment mean (10.5), and the verbal only treatment mean (9.9). Table 1 summarizes these results.

Insert Table 1 about here

Because the theory-based hypotheses about differences among means (and about the rank order of the means) had been stated prior to the study, planned comparisons were appropriate for analysis of the data. The model presented earlier predicted that the verbal to imaginal group mean would be higher than the imaginal to verbal group mean. The model also predicted that presenting concepts in both modes would produce greater comprehension than would presenting them only in one mode.

The results of the two planned comparisons supported the predictions. (1) The mean of the "verbal to imaginal" group was statistically significantly greater than the mean of the "imaginal

to verbal" group ($p < .005$). (2) Both the mean of the "verbal to imaginal" group and the mean of the "imaginal to verbal" group were significantly greater than the mean of the "verbal only" group ($p < .005$ and $p < .05$). Thus, the data supported both Hypothesis 1 and Hyopthesis 2 of this study.

Table 2 presents the treatment means and standard deviations on the posttest. The economic understanding score treatment means rank from high to low as predicted in the model presented earlier. Table 3 presents (1) the percentage of learners in each group who attempted any graphic depiction of posttest answers and (2) the percentage of learners who drew correct graphs of posttest answers.

Insert Tables 2 and 3 about here

The "verbal to imaginal" group had the greatest percentage of students (96.4%) who drew graphs of one or more posttest answers, followed by the "imaginal to verbal" group (35.7%) and the "verbal-only" group (7.7%). The subjects in the "verbal to imaginal group" were also superior to the other two groups in the percentage of correct graphs they drew of posttest answers (80.2% versus 41.6% and 0%).

Discussion

In this experiment, we examined two hypotheses about the teaching of economics derived from a model of generative learning.

To test these two predictions, "time to learn" was held constant, and students were individually randomly assigned to three classes. These classes were then randomly assigned to the three treatments that represented three different sequences of instruction.

The first hypothesis was that instruction that proceeds from verbal to imaginal representation of economics concepts produces greater comprehension than does comparable instruction of equal length that proceeds from imaginal to verbal representations.

The second hypothesis was that either verbal to imaginal instruction or imaginal to verbal instruction produces greater learning and comprehension of economics concepts than does a comparable control treatment that presents only verbal instruction.

The treatment means on the posttest of learning and comprehension of economics ranked from high to low as predicted by the model: (1) verbal to imaginal instruction (14.1), (2) imaginal to verbal instruction (10.5), and (3) verbal instruction only (9.9). Planned comparison tests indicated that these predicted mean differences were statistically significant. Both hypotheses were supported.

The mechanism hypothesized to mediate student learning differently in these treatments is the number and quality of verbal or imaginal representations that the treatment induces the students to construct during instruction. To measure the different learning mechanisms mediating the treatment differences,

the percent of students attempting to graph the economic concepts in each treatment was recorded. In addition, the percent of learners in each treatment drawing correct graphs of the economics concepts was also recorded. These data regarding imaginal representations of economic concepts indicated that 96% of the students in the verbal to imaginal treatment, 36% in the imaginal to verbal treatment, and 8% in the verbal only treatment used graphs to depict the economics concepts. The treatments influenced the students use of graphs to represent relations among the concepts they were learning.

The data regarding accuracy of use of graphs followed a similar pattern. The percent of graphs correctly drawn were 80% for the verbal to imaginal group, 42% for the imaginal to verbal group, and 0% for the verbal only group. These data about accuracy also indicate that the treatments influenced the use of mental representations, enhancing their accuracy as well as their frequency, as predicted by the model of generative learning.

Taken together, the posttest data about treatment effects upon economics achievement and upon students' thought processes indicate that instruction which proceeds from a familiar verbal mode of representation of concepts to an unfamiliar imaginal mode of representation facilitates learning and comprehension of fundamental concepts of economics. The facilitation might occur in two ways. First, proceeding from familiar to unfamiliar representations can induce learners to construct, more frequently

and more accurately, additional relations across the economic concepts they are learning. In this study, these representations were graphs drawn by students. Second, the increased use of imaginal representations can establish generic knowledge schema which enhance the learner's ability to apply concepts to analogous situations.

Because students were individually randomly assigned to classes, which were randomly assigned to treatments, the probability of these results occurring by chance (e.g. by pre-experimentally determined differences across the treatment) are less than 1 in 100. Because the study was a true experiment, a probable cause of the mean differences was the difference due to the instruction. All the students in the study had previously scored adequately on a pretest of ability to understand and use imagery. These precautions make less likely a wide variety of alternative explanations of the findings, such as spurious pre-experiemtal differences in learners, or a general inability to understand and to use graphs or imagery. In addition, the content and the length of the instruction was held constant across the treatments. Only the order of presenting the verbal and imaginal representations of the concepts varied between these experimental treatments.

Because of these precautions, a reasonable, explanation of the data is that, as predicted, the treatments influenced the mental representations constructed by the learners during

instruction. These different representations of concepts, in turn, influenced the students' learning and comprehension, as measured on the posttest.

One implication of the findings is that the teaching of concepts like demand and supply may be improved by designing instruction that initially presents basic concepts in a familiar verbal mode and then proceeds to a graphic or spatial mode. In contrast, many instructors of economics and a significant number of economic textbooks tend to introduce the economic concepts in their graphical forms and then present verbal expositions. For example, a typical textbook will present a production possibility curve and then explain its meaning. It is common for an economics teacher to present a demand (or supply) curve and then explain how it works. Our research suggests that it may be more efficacious first verbally to explain the concept and then to move from a familiar mode to a less familiar mode--the graphical depiction of the concept. When instruction proceeds from an unfamiliar representation to a familiar representation, the effort used to learn the unfamiliar representation (in this case the graphical depiction) may hinder the learning of the economics concept. In contrast, once a student becomes familiar and comfortable with a previously unfamiliar mode of representation (e.g. graphs), (s)he will tend to try out that new mode. Note that in this study 96% of the participants in the verbal to imaginal group attempted to use graphical depctions in their analysis.

It would be interesting to replicate the procedures of this study in more advanced economics courses, e.g. intermediate or advanced price theory, where the student typically is already familiar with graphical representations. We predict that the combination of verbal and imaginal instruction would still yield gains in learning, but that there would be little or no difference between various orderings of the two treatments. Finally, there are concepts for which the imaginal representation may be intrinsically more familiar than the verbal representation, e.g. the theory of gyroscopic precision of a spinning top (in physics). A provocative test of the generative hypothesis would be to investigate whether imaginal to verbal ordering is more effective than the verbal to imaginal ordering for such concepts.

References

Dennis, D., & Banaszak, R. A. (1981). A study of state mandates for economics education. Stockton, CA: Center for Development of Economics Education, University of the Pacific, School of Education.

Kourilsky, M. (1979, Summer). Optimal intervention: An empirical investigation of the role of the teacher in experience-based instruction. The Journal of Experimental Education, 47(4), 339-345.

Kourilsky, M. (1979, January). The kinder-economy: A case study of kindergarten pupils' acquisition of economic concepts. The Elementary School Journal, 77(3), 182-191.

Kourilsky, M. (1983, May). Understanding economics: Overview for teachers, experiences for students. Addision-Wesley Publishing Company, Inc.

Paivio, A. (1971). Imagery and verbal processes. New York: Holt, Rinehart, & Winston.

Shaheen, M. W. (1985). Perceived influence of legislative mandating of economics on teachers' morale, autonomy, and professional performance. Unpublished doctoral dissertation. University of California, Los Angeles.

Wittrock, M. C. (1974). Learning as generative processes. Educational Psychologist, 13, 15-30.

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Wittrock, M. C. (1978). The cognitive movement in instruction. Educational Psychologist, 13, 15-30.

Wittrock, M. C. (1981). Reading comprehension. In F. G. Pirozzolo & M. C. Wittrock (Eds.), Neuropsychological and cognitive processes of reading. New York: Academic Press.

Footnotes

[1]For each group any subject who did not demonstrate rudimentary (50% accuracy) skill with imagery was excluded from the study. The number of subjects excluded were 3 from the first group (Verbal to Imaginal), 3 from the second group (Imaginal to Verbal), and 2 from the third group (Verbal Only).

[2]However the proclivity of suppliers to offer more at higher prices and less at lower prices was presented as a tendency rather than a universal concept.

[3]$B_1 = A_5$; B_2(part 1) = A_6; $B_3 = A_6$(part 2); $B_4 = A_4$; $B_5 = A_1$; B_6(part 1) = A_2; B_6(part 2) = A_3; $B_7 = A_7$; $B_8 = A_9$; $B_9 = A_8$.

Appendix A: Treatments

Verbal to Imaginal

1. The teacher through lecture and discussion explained the five characteristics of demand including the universal characteristics of demand. Specifically, the teacher through exposition described in detail the following: (a) how demand is desire backed by the ability to pay, (b) why demand is a rate or flow concept, (c) why demand is not a historical or statistical concept, (d) why demand exists independently of the availability or current price of a good, and (e) why at some higher price (which may be significantly different for different people) individuals will reduce the quantities of a good they purchase or demand, and at some lower price, individuals will increase the quantities of a good they will purchase or demand (the universal characteristic of demand).
2. The teacher through lecture and discussion explained the three determinants of demand that cause changes in demand. The most inclusive of the demand determinants, tastes, embraces all the factors that affect an individual's subjective attitude about a good. For example, if advertising makes individuals willing to give up more dollars for the purchase of a particular good than they would previously have been willing to give up, this

represents a change in demand brought about by a change in tastes. Changes in income will tend to change the demand for products. Changes in income will not affect all demands in the same way or to the same extent--an increase in income might decrease the demand for chuck meat and increase the demand for tenderloin. In general, however, the change in demand will be in the same direction as the change in income. Finally, changes in the price of other goods in a market will influence the willingness of people to pay various prices for a specific good. The influence will depend on the relationship between the goods. If the related good is a substitute good (a substitute is something that may be used in place of the product under consideration), an increase in its price will cause an increase in the demand for its substitute. If the two goods are complementary (if they are used together), an increase in the price of one will cause a decrease in the demand for the other.

3. The teacher through lecture and discussion explained the difference between a change in demand (the demand function itself) versus a change in the quantity demanded. The teacher used the example of reducing the price of admission to movies versus attempting to change the entire demand function by advertising home-made popcorn.

4. The teacher on the chalkboard depicted the concept of demand through use of a demand schedule. She had a fudge sucker from See's Candies. She then chose ten students randomly and asked them to indicate how many of these candy bars they would buy at various prices ranging from $1.00 per sucker to five cents per sucker. She added their individual demands and represented these demands through a demand schedule. showing alternative prices and the quantity demanded at each price.

5. The teacher on the chalkboard and the students on quad paper converted the demand schedule into a demand curve. She explained that it was customary to measure the quantities of the good on the horizontal axis, with zero represented at the origin; on the vertical axis the various prices of the good are expressed, again with zero at the origin. She then drew this diagram of the suckers (see Figure 5), and put the range of prices in five cent increments (0, 5, 10, 15, etc.), on the vertical axis and the range of quantities on the horizontal axis. Each youngster then on a piece of quad paper took each point on the demand schedule and plotted it on a demand curve. S(he) then drew a line connecting the points. The curve which sloped downward to the right on the diagram indicated that at higher prices the quantity demanded would be less than that at lower prices (see figure 6).

Insert Figure 5 about here

Insert Figure 6 about here

6. The teacher on the chalkboard and the students on quad paper demonstrated through imagery (graphs) decreases and increases in demand (moved the demand curve to the left and to the right). The hypothetical example they were given was a situation in which it was alleged that these suckers were known to triple one's chances of getting acne. The same ten individuals as previously selected were asked to indicate how many suckers they would now buy at the alternative prices. The whole class was then asked to convert the demand schedule into a demand curve illustrating a decrease in the demand function itself. They were then given a hypothetical situation in which they were told a study had been completed in which it was found that sex appeal was highly correlated with the consumption of See's Suckers. They were told to assume they believed these results. The same ten students were then asked to convert each of their demand schedules into a demand curve, indicating an increase in the demand function itself.

Insert Figure 7 about here

Insert Figure 8 about here

7. The above 6 steps were followed analagously with regard to presenting the concept of supply. The exact same sequence and procedure was utilized. First the teacher explained verbally the characteristics of supply including the fact that most suppliers are willing to provide more of their product at higher prices. Then they were given a verbal explanation of the determinants of supply; next the teacher lectured on the difference between a change in supply (the whole supply function itself) versus a change in the quantity supplied. Next, through two classroom examples (the See's Suckers, and baby-sitting time) they created a supply schedule and then converted the supply schedule into a supply curve. The entire sequence was exactly analogous to the teaching sequence on demand (see Kourilsky, 1983).

Insert Figure 9 about here

8. The teacher through lecture and discussion explained how equilibrium (or market) price is one way of rationing goods and services among possible uses. She illustrated the concept of equilibrium price by asking the student what might happen if the equilibrium price of wheat on the Chicago Board of Trade were $3.50 a bushel and the market thought it was $7.00 a bushel. Through discussion and dialogue she encouraged the students to verbalize that the increased amounts brought to the market (as a result of the mistaken impression that the equilibrium price was higher than it actually was) would drive the price down. She then asked them what would happen if the market thought the equilibrium price were $2.00 when it was actually $3.50. The students were then encouraged to reason that the mistaken impression that the equilibrium price was lower than it actually was would result in driving the price up. The students through lecture, questions, and prompting were ultimately encouraged to explicate how and why there are ultimate forces in markets that, left to themselves, establish a price that tends to satisfy the conflicting attitudes of suppliers and demanders--that price where quantity offered is identical to the quantity demanded.

9. The teacher graphically depicted equilibrium (market) price--a condition in which all who are willing to produce a product at the equilibrium price are able to find consumers who are willing to buy the product at this equilibrium price.

Insert Figure 10 about here

Appendix B: 10 Item Test

True-False (Justify Your Answer)

1. If consumers found out that muskateer candy bars cause teeth to fall out, the demand for the muskateer candy bars would probably remain constant.
2. An increase in the price of a good could cause a decrease in the demand for that good.
3. The law of downward sloping demand has been repealed. Everyone knows that regardless of the price of a haircut you only have one head of hair to cut.
4. There is no difference between the concept of demand and a movement along the demand curve.
5. Demand refers to more than desire and wants. It refers to desires backed by the ability to pay.
6. The concept of supply shows how much of a product you are willing to buy at different prices.
7. If a producer's cost go down s/he probably will supply less of the product.
8. If the supply of a good increases, its price will probably decrease.
9. If the quantity supplied of a good is greater than the quantity demanded, the price of the good probably will go up.
10. The only <u>sure</u> way to relieve California's <u>shortage</u> of housing is to construct more housing.

Table 1

Analysis of Variance Summary Table

Source of Variation	Sum of Squares SS	df	Mean Square MS	F
Between groups	279.075	2	139.54	13.98*
Within groups	788.807	79	9.98	
Total	1067.382	81		

*$p < .01$

Table 2

Economic Understanding Score Means and Standard Deviations

	Treatment Conditions		
	Verbal to imaginal (n=28)	Imaginal to verbal (n=28)	Verbal only (n=26)
Economic understanding			
Mean	14.1	10.5	9.9
Standard deviation	2.8	3.5	3.1

Table 3

Percent of Learners Who Drew Graphs

	Treatment Conditions		
	Verbal to imaginal (n=28)	Imaginal to verbal (n=28)	Verbal only (n=26)
% of learners attempting to draw any graphs	27/28= 96.4	10/28= 35.7	2/26= 7.7
% of learners who drew correct graphs	89/111= 80.2	15/36= 41.7	0/20= 0.0

Figure 1

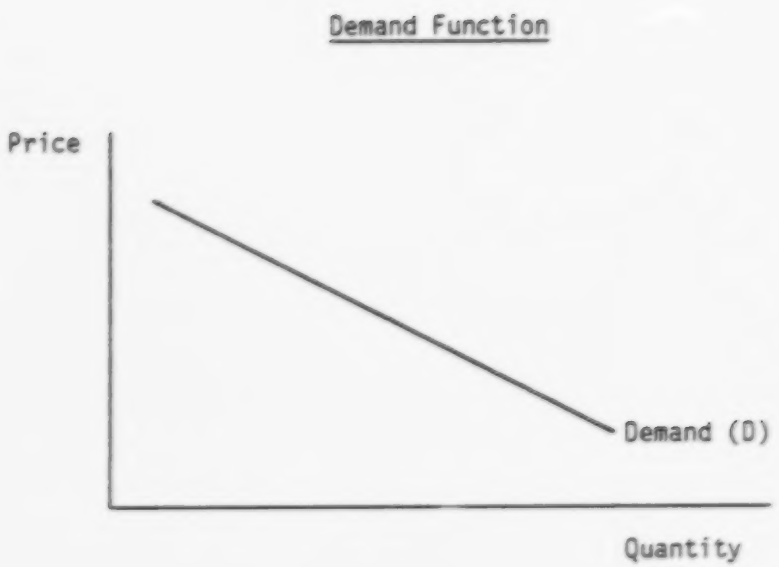

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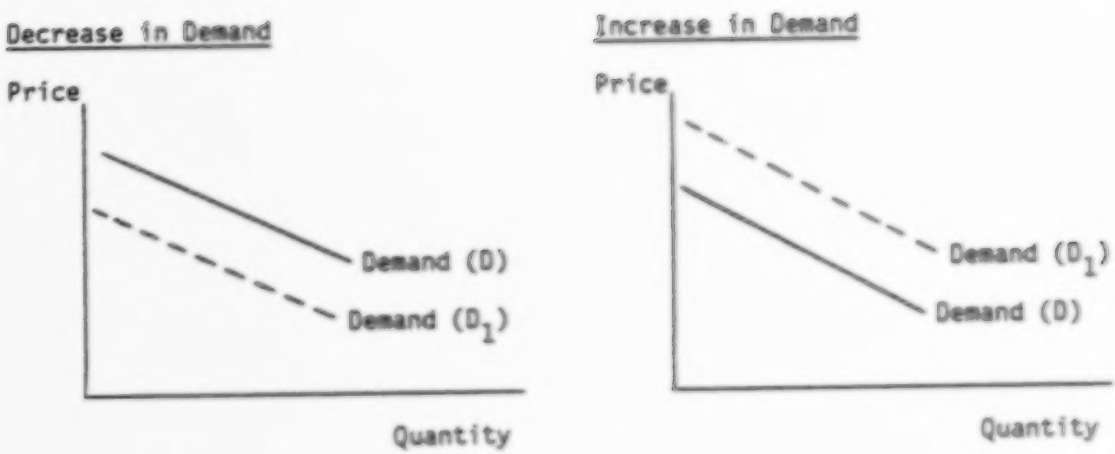
Figure 2



X3MLK/U

Figure 3

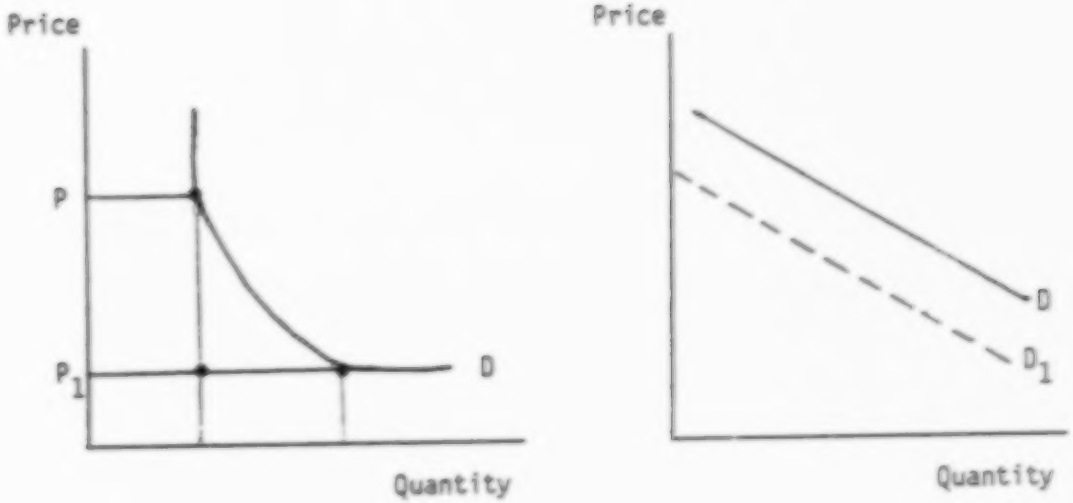


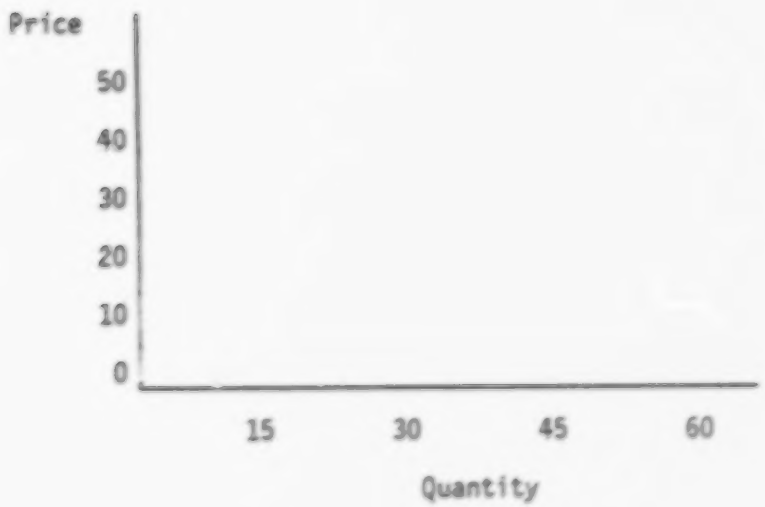
Figure 4

Demand Schedule

Price	Quantity Demanded
$ .40	0
.30	15
.20	30
.10	45

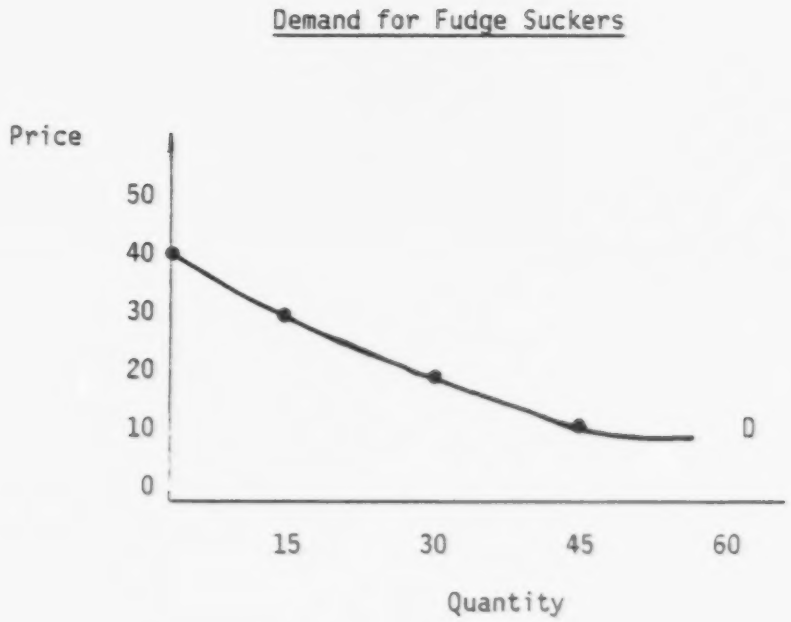
Figure 5

Diagram of Axes For Alternative Prices and Quantities



X3MLK/U

Figure 6



X3MLK/U

Figure 7

Decrease in Demand for Fudge Suckers

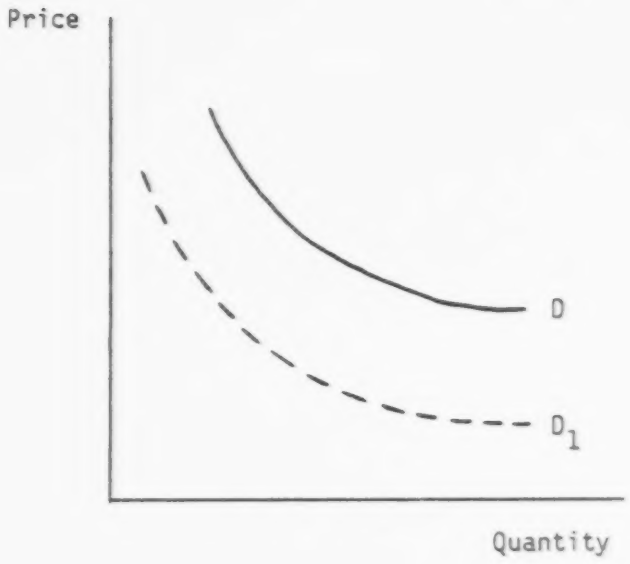
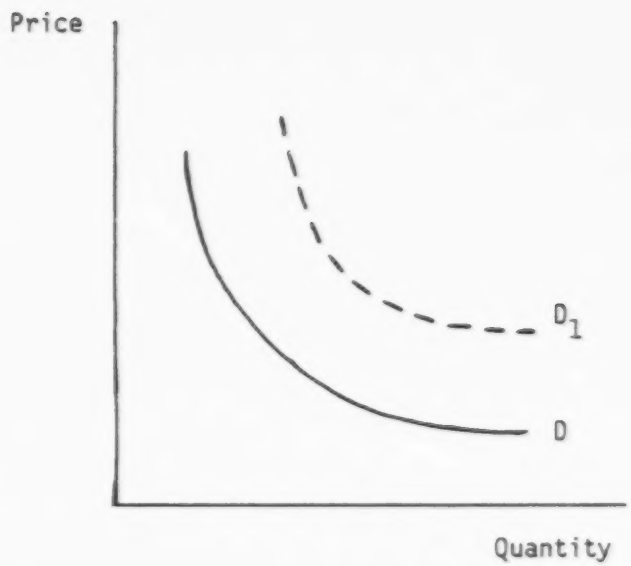


Figure 8

Increase in Demand for Fudge Suckers



X3MLK/U

Figure 9

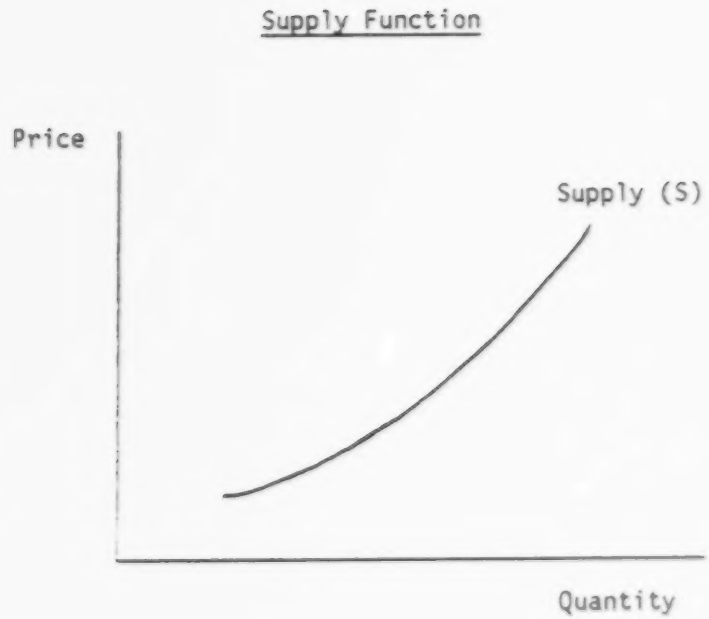
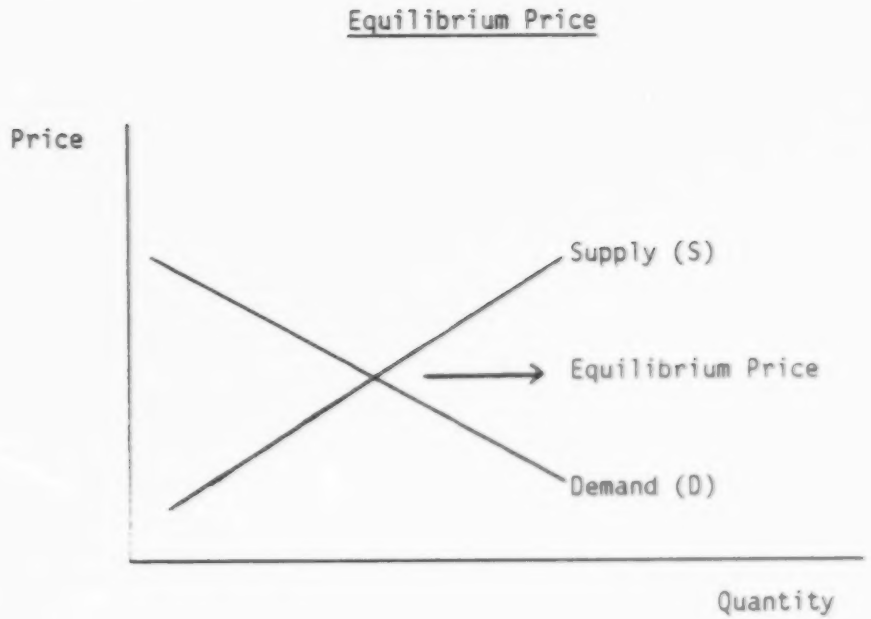


Figure 10


Equilibrium Price
Price
Supply (S)
Equilibrium Price
Demand (D)
Quantity